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10/584,352

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EXAMINER

SLAWSKI, BRIAN R

ART UNIT

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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|------------------------------|--------------------------------------|---------------------------------------|--|
| Office Action Summary | Application No. 10/584,352 | Applicant(s) KIKUCHI ET AL. | |
| | Examiner BRIAN R. SLAWSKI | Art Unit 1791 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

METHOD OF MANUFACTURING FLEXIBLE LAMINATE SUBSTRATE

Examiner: Slawski S.N.: 10/584,352 Art Unit: 1791 June 6, 2008

Detailed Action

1. Applicant's amendment filed on March 19, 2008, was received. The specification was amended. Claim 1 was amended.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections—35 USC §112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "tension varying means" (claim 1, line 8) is considered indefinite by the examiner, as it is unclear whether Applicant intends a means of dynamically adjusting the tension applied to the laminate (i.e., such that the tension applied varies over time), or merely a means of applying tension to the laminate in a particular region. For the interest of compact prosecution, the term "tension varying means" is interpreted as "tension applying means," i.e., a means of both pulling on the laminate in one direction and of resisting this pulling.

Claim Rejections—35 USC §103

4. Claims 1-3, 5, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hase et al. (WO01/32418) in view of Fukada (US 2002/0108709, newly cited previously of record). (Subsequent references to Hase et al. are based on the corresponding U.S. Patent No. 7,101,455).

Regarding Claim 1, Hase et al. teach a method of manufacturing a flexible laminate substrate suitable for a flexible circuit board (Abstract). The laminate 6 includes copper foils 1 bonded onto at least one surface of a heat-resistant polyimide adhesive film 2. The laminate is thermally bonded via a protective film 3 between one or more pairs of metal rolls 4, after which the protective film is peeled off (Fig. 1(a); col. 1, L. 25-31 ; col. 2, L. 8-19; col. 8, L. 16-28).

Hase et al. do not explicitly disclose applying greater tension to the laminate during the delamination of the protective film than after the passage between the metal rolls. However, Hase et al. teach that when the polyimide and copper are thermally bonded they expand at different rates, and that tension during the adhesion process should therefore be reduced to the minimum needed for the webs to stably proceed, in order to prevent distortion of the laminate on cooling (col. 3, L. 11-31; col. 5, L. 32-38). While Hase et al. emphasize minimal tension preceding the heated rolls 4, one skilled in the art would have recognized that the laminate would remain hot and thus susceptible to tension-induced distortion immediately after the heated rolls as well. (Indeed, Hase

et al. specifically teach an embodiment wherein the laminate is cooled by cooling guides 28 after thermal bonding [Fig. 2; col. 8, L. 49-52, L. 61-65; col. 9, L. 3-5].)

Furthermore, Fukada teaches a process wherein a waste matrix 4 is continuously peeled around a peeling roller 3 to separate from an advancing web 1 (Fig. 1, 2).

Fukada teaches that tension must be applied to the web 1, in order to stably transport the web 1 and stably separate the waste matrix 4. Fukada teaches that one possible means of applying this tension is with an upstream brake roller 8 that opposes the downstream driven roller 7 advancing web 1 [0007-0008].

It would have been obvious to one of ordinary skill in the art to apply greater tension to the laminate of Hase et al. by tension varying means during delamination of the protective film than after passage between the metal rolls, because Hase et al. teach that the least possible tension should be applied to the laminate during the adhesion process, while Fukada et al. teach that an advancing web must be tensioned by tension varying means if it is to remain stable when diverting and peeling an adhered film therefrom.

Regarding Claim 3, the combination of Hase et al. and Fukada does not specifically teach a tension on the laminate from 50 N/m to 500 N/m inclusive during the delamination of the protective film. However, Fukada recognizes that the amount of tension applied to an advancing web when diverting and peeling an adhered film therefrom will determine whether or not the web remains stable, as described above. In view of these teachings, it would have been within the level of ordinary skill in the art to adjust the tension applied to the laminate of Hase et al. during the delamination of the

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protective film, in order to ensure the stable propagation of the laminate. Discovery of the optimum value of a result-effective variable in a known process is ordinarily within the skill of the art. In re Boesch, CCPA 1980, 617 F.2d 272,205 USPQ215.

Regarding Claim 3, Hase et al. do not specifically teach a tension on the laminate from 10 N/m to 200 N/m inclusive after the passage between the metal rolls. However, Hase et al. recognize that the amount of tension applied to the laminate during the adhesion process is important, teaching that too much tension can cause distortion of the laminate due to different rates of expansion of the copper foil and polyimide film, as described above. In light of these teachings, it would have been within the level of ordinary skill in the art to adjust the tension applied during lamination to achieve satisfactory adhesion without distortion of the laminate. Discovery of the optimum value of a result-effective variable in a known process is ordinarily within the skill of the art. In re Boesch, CCPA 1980, 617 F.2d 272,205 USPQ215.

Regarding Claim 5, Hase et al. teach bringing the temperature of the laminate below the glass transition temperature of the thermoplastic resin adhesive film before peeling the protective film, as the protective film does not peel off easily at high temperature. Hase et al. teach that it is most preferable to peel the protective film from the laminate at room temperature (col. 11, L. 9-20).

Regarding Claim 6, Hase et al. teach the use of a protective polyimide film that is non-thermoplastic (col. 4, L. 66-67; col. 5, L. 1-3).

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hase et al. and Fukada as applied to Claims 1-3, 5, and 6 above, and further in view of Yamamoto et al. (US 4,865,675).

Hase et al. do not explicitly teach a method wherein the tension after the passage between the metal rolls and before delamination is regulated using nip rolls, but do teach that the materials' different rates of thermal expansion can distort the laminate if tension is not minimized during adhesion, as described above. Hase et al. further teach an embodiment in which the laminate passes through multiple pairs of nip rolls 4a before delamination of the protective film (Fig. 4; col. 14, L. 56-65).

Yamamoto et al. teach a method of laminating a plurality of webs in the nip between hot press rollers R1, wherein, similarly, different rates of thermal expansion of the webs can cause curl or wrinkling of the laminate (see Fig. 1 ; col. 2, L. 21-28; L. 38-40). Yamamoto et al. teach that this wrinkling can be avoided by passing the laminate back and forth between the hot press rollers via delivery rollers R2 and R3, where the circumferential speeds of the pairs of rollers are controlled so as to regulate the tension on the laminate (col. 3, L. 16-37). It would have obvious to one having ordinary skill in the art to regulate the tension on the laminate of Hase et al. using nip rolls, because Hase et al. teach that this tension during adhesion must be moderated to prevent distortion of the laminate, while Yamamoto et al. teach that nip rolls are an effective means of regulating tension in a traveling laminate.

Response to Amendment

6. Applicant's arguments filed March 19, 2008, with respect to the rejection(s) of claim(s) 1, 3, 5, and 6 under Hase et al. in view of Kerr et al. (US 5,478,434) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made over Hase et al. in view of Fukada.

Applicant's arguments concerning the previously presented combination of Hase et al. in view of Kerr et al. were that the stripper bar of Kerr et al. does not provide a means of increasing the tension on the laminate during delamination of the carrier sheet, and that Kerr et al. teaches applying tension to the carrier sheet (analogous to the protective film of Hase et al.) rather than to the laminate. However, the newly presented combination of Hase et al. and Fukada provides the claimed subject matter not taught by Kerr et al., in that Fukada teaches that tension must be applied to an advancing laminate web, when diverting and peeling an adhered film therefrom, in order to avoid destabilizing the laminate. Fukada teaches an exemplary means of applying this tension, in the form of a downstream driven roller that pulls the laminate combined with an upstream brake roller that resists the laminate's progress.

Regarding Claim 4, Yamamoto et al. is again cited as teaching that nip rolls are an effective means of regulating tension on a traveling laminate. As Applicant did not contest this teaching in the arguments filed March 19, 2008, Applicant appears to be in agreement with the Office's interpretation of this reference.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRIAN R. SLAWSKI whose telephone number is (571)270-3855. The examiner can normally be reached on Monday to Thursday, 7:30 a.m. to 5:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino, can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Brian R. Slawski/
Examiner, Art Unit 1791

/Jeff H. Aftergut/
Primary Examiner, Art Unit 1791

BRS